ISS FACILITIES HARDWARE CATALOG
for
NASA Space Acceleration Measurement System-II

I. Facility

1. Facility Full Name: Space Acceleration Measurement System-II (SAMS-II)

2. Sponsoring Agency: NASA

3. Co-Sponsors/Cooperation Agreements:

4. Builder/Main Contractor: NASA Lewis Research Center

5. Project Manager: Thomas Sutliff
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II. Facility Characteristics

1. Facility Type: Distributed general purpose microgravity acceleration measurement system with data storage, analysis, and telescience capabilities

2. Targeted Research Fields: Microgravity science support; vehicle monitoring and characterization

3. Accommodation: ISS/US Lab; initial data acquisition capability provided on UF-1; full capability for data analysis and telescience provided at UF-5

4. Launch Date: UF-1 (1/00)

5. Status: (ref. 6/97) Requirements defined; advanced concept in place; flight hardware in fabrication

6. Facility Summary: The SAMS-II capability provides an acceleration measurement system serving the needs of microgravity science experiments on ISS. It provides data supporting experiments that are affected by local accelerations and contributes to the characterization of the ISS environment. The system consists of a control unit (providing control, data recording, analysis and downlink), remote triaxial sensors (measuring experiment-specific locations chosen by the users), and ground operations equipment (serving as the gateway enabling investigators to command and control measurements). Operations are coordinated at the Lewis Telescience Support Center; experiment-specific operating parameters are controlled by science users.

6. Facility Summary (continued): SAMS-II will deploy three types of primary on-orbit elements: twelve Remote Triaxial Sensor-Sensor Enclosures (RTS-SE), nine RTS-Electronics Enclosures (RTS-EE), and a control unit.

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III. Facility Performance Data

The SAMS-II capabilities support simultaneous vibratory acceleration measurements at up to 10 active locations using RTS hardware. A single quasi-steady sensor also provides low frequency acceleration information. For the vibratory accelerometer, the frequency range is selectable within the range of 0.01 Hz to 25-300 Hz. The quasi-steady sensor measures from 0.18 mHz to 0.01 Hz. A summary of performance and operational specifications are tabulated below:

Performance Specifications:

- acquisition of temperature compensated digital acceleration data
- 0.18 mHz -300 Hz system data bandwidth
- 0.003 micro-g - 0.01 g dynamic range (Q-SICA sensor)
- 0.1 micro-g - 1.0 g dynamic range (RTS-SE)
- on-orbit data analysis
- feedback of information to operating payloads

Operations Specifications:

- uplinkable commands /downloadable data (optional removable media)
- minimal crew time (maintenance activities only)
- data rates

- 80 kbits/sec per RTS-SE
- 240 kbits/sec aggregate downlink from ICU
- 800 kbits/sec aggregate downlink from CU

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IV. Resource Requirements

The SAMS-II system is expected to be 'permanently' installed on the ISS and have a minimum life of 10 years. The SAMS-II system resource requirements are tabulated by system element below. Note that the Control Unit replaces the Interim Control Unit at UF-5. Multiple users are expected to simultaneously access the (I)CU, while individual users are provided with RTS sensors and are required to provide appropriate resources for operation.

Interim Control Unit (ICU)
- ISS qualified laptop containing SAMS-II specific operating software
- Laptop mounted to a shelf structure, middeck locker attachment interface
- 10 kg (22 lb)
- <1 Middeck Locker-equivalent volume 0.065 m^3 (4000 cu-in)
- 40 W, passive cooling
- MRL (ethernet) data interface to RTS-EE, to downlink path

Control Unit (CU)
- 48 kg (105 lb)
- 8PU drawer or 1 Middeck Locker volume 0.065 m^3 (4000 cu-in), custom enclosures
- 260 W, water cooled (moderate temperature loop)
- MRL (ethernet) data interface to RTS-EE, to downlink path
- Quasi-steady measurement subsystem (Q-SICA) for 0-0.01 Hz rigid body measurements

Remote Triaxial Sensor (RTS), (Electronics Enclosure, Sensor Enclosure)
- 5.0 kg (11 lb); 1.5 kg (3.3 lb)
- 0.00761 m^3 (465 cu-in); 0.00288 m^3 (176 cu-in)
- 28 W (one -Electronics Enclosure and 2 -Sensor Enclosures) , conduction cooling to base
- custom enclosures
- MRL (ethernet) data interface to Control Unit